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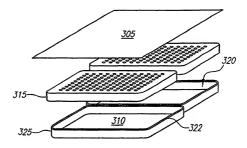
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(54) Title: BATTERY PACK DESIGN FOR METAL-AIR BATTERY CELLS

## (57) Abstract

A high capacity primary (single-use; non-rechargeable) battery pack for high current portable appliances as cellular phones employs electrochemical cells that use ambient oxygen for one of the electrodes. The pack makes possible a simple low cost design by providing for oxygen supply in a completely passive yet compact configuration. To provide for compactness while providing the high gas exchange rates required of high current devices in a passive air management design, a variety of design tactics are developed and applied in various embodiments. Cells may be arranged inside a housing in a tightly packed arrangement by providing internal



spaces that are sized to permit diffusion and, if possible, bulk air flow. The highest volumetric energy density is achievable by permitting bulk flow of air into the housing. The free exchange of gases while preventing the entry of water into the area containing the cells is addressed by encapsulating the cells in a water-impermeable material with a gas-permeable portion. In a preferred configuration, the cells are arranged in trays and sealed in the trays with porous Tefion of the cell surfaces that exchange gases.